



ORIGINAL ARTICLE

Efficacy of vision therapy in children with learning disability and associated binocular vision anomalies

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KEYWORDS

Binocular vision anomalies;
Learning disability;
Non-strabismic binocular vision anomalies;
Convergence insufficiency;
Accommodative infacility

Abstract

Purpose: To report the frequency of binocular vision (BV) anomalies in children with specific learning disorders (SLD) and to assess the efficacy of vision therapy (VT) in children with a non-strabismic binocular vision anomaly (NSBVA).

Methods: The study was carried out at a centre for learning disability (LD). Comprehensive eye examination and binocular vision assessment was carried out for 94 children (mean (SD) age: 15 (2.2) years) diagnosed with specific learning disorder. BV assessment was done for children with best corrected visual acuity of $\geq 6/9$ – N6, cooperative for examination and free from any ocular pathology. For children with a diagnosis of NSBVA ($n = 46$), 24 children were randomized to VT and no intervention was provided to the other 22 children who served as experimental controls. At the end of 10 sessions of vision therapy, BV assessment was performed for both the intervention and non-intervention groups.

Results: Binocular vision anomalies were found in 59 children (62.8%) among which 22% ($n = 13$) had strabismic binocular vision anomalies (SBVA) and 78% ($n = 46$) had a NSBVA. Accommodative infacility (AIF) was the commonest of the NSBVA and found in 67%, followed by convergence insufficiency (CI) in 25%. Post-vision therapy, the intervention group showed significant improvement in all the BV parameters (Wilcoxon signed rank test, $p < 0.05$) except negative fusional vergence.

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PALABRAS CLAVE

Anomalías en la visión binocular;
Trastorno de aprendizaje;
Alteraciones en la visión binocular no estrábica;
Insuficiencia de convergencia;
Inflexibilidad acomodativa

Conclusion: Children with specific learning disorders have a high frequency of binocular vision disorders and vision therapy plays a significant role in improving the BV parameters. Children with SLD should be screened for BV anomalies as it could potentially be an added hindrance to the reading difficulty in this special population.

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Eficacia de la terapia visual en niños con trastorno de aprendizaje y anomalías en la visión binocular asociadas

Resumen

Objetivo: Reportar la frecuencia de las anomalías en la visión binocular (VB) en niños con trastornos específicos de aprendizaje (SLD), y evaluar la eficacia de la terapia visual (TV) en niños con alteraciones en la visión binocular no estrábicas (NSBVA).

Métodos: El estudio se llevó a cabo en un centro para discapacidades de aprendizaje (LD). Se realizó un amplio examen ocular y una valoración de la visión binocular en 94 niños (Media (DE) edad: 15 (2,2) años) con diagnóstico de trastorno específico de aprendizaje. Se llevó a cabo una valoración de la VB en los niños, con agudeza visual mejor corregida de $\geq 6/9 - N6$, que cooperaron durante el examen, y que carecían de patología ocular. En los niños con diagnóstico de NSBVA ($n=46$), se aleatorizaron 24 de ellos para terapia visual, sin realizar intervención alguna en los 22 niños restantes, que sirvieron de controles. Al finalizar las 10 sesiones de terapia visual, se realizó una valoración de VB tanto en el grupo de intervención como en el de no intervención.

Resultados: Se encontraron anomalías en la visión binocular en 59 niños (62,8%), de entre los cuales el 22% ($n=13$) tenían alteraciones en la visión binocular estrábica (SBVA), y el 78% ($n=46$) reflejaron NSBVA. La inflexibilidad acomodativa (AIF) fue la NSBVA más común, estando presente en el 67% de los casos, seguida de la insuficiencia de convergencia (CI) en 25% de ellos. Tras la terapia visual, el grupo de intervención reflejó una mejora significativa en todos los parámetros de VB (prueba de los rangos con signo de Wilcoxon: $p < 0,05$) exceptuando la vergencia fusional negativa.

Conclusión: Los niños con trastorno específico de aprendizaje tienen una elevada frecuencia de anomalías en la visión binocular, y en ellos la terapia visual juega un papel significativo para la mejora de los parámetros de VB. Deberá supervisarse a los niños con SLD, en relación a las anomalías de VB, que podrían suponer un obstáculo añadido a la dificultad lectora en esta población especial.

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Introduction

Learning disability (LD) has been defined as "A generic term that refers to a heterogeneous group of disorders manifested by significant difficulties in the acquisition and use of listening, speaking, reading, writing, reasoning, or mathematical skills".¹ Specific LDs have been reported to be affecting specific domains of reading, written expression and mathematics, with reading as the majorly affected domain.² In India, the reported prevalence of specific learning disabilities is 15.17% among 8–11 year old children.³ As reading is a primary concern under the SLD, it also raises concern about the efficiency of the visual system that could contribute to the reading impairment.⁴ About 80% of children with learning disability are shown to be affected with accommodation and vergence anomalies that include convergence

insufficiency (CI), reduced amplitude of accommodation (AOA), reduced accommodative and vergence facility, low accommodative convergence/accommodation (AC/A) ratio and reduced fusional ranges.^{5,6}

Also children with reading and writing difficulties are shown to have deficits in accommodation and vergence parameters compared to age matched controls without reading and writing difficulties.^{7–11} It has been shown that these dysfunctions can interfere with the reading speed, accuracy, and reading efficiency.¹¹ Thus assessing the efficiency of the binocular vision in children with learning disorders is highly recommended. The efficacy of vision therapy in the treatment of binocular vision anomalies is well established among children attending regular stream education.¹² Yet there is paucity of randomized controlled trials testing the efficacy of vision therapy in this special

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